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HYPNOTIC INDUCTION PROFILES, CONTEXTUAL INNUENDO, AND DELAYED INTRUSION ERRORS FOR A NARRATIVE: SEARCHING FOR MEDIATING VARIABLES[1]

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Summary.—18 young men and 18 women listened to an ambiguous narrative concerning the nocturnal experiences of a young boy and then, after an inventory on hypnotic induction and a dichotic word-listening task, were asked to estimate the prevalence of child abuse or abduction by aliens (a third group served as controls). One week later the subjects were asked to reconstruct the narrative. Scores for suggestibility, estimates of prevalence, the sense of a presence during the first sitting and less cerebral lateralization were loaded on the same factor. Although the three groups did not differ with respect to numbers of literal memories, the groups who were given either one of the two innuendos also included an additional 11% of inferences and paraphrases which were considered erroneous reconstructions of the memory of the narrative.

Context and innuendo at the time of encoding can significantly influence the numbers of inferences, intrusive errors, and omissions during the reconstruction of a narrative. We have suggested that stories or narratives that contain ambiguous emotionally (socially) provocative themes access or activate proportionally more right hemispheric processes. Because (1) the neurocognitive patterns for right-hemispheric processes emphasize affective (Whissell & Kienapple, 1995) dimensions whereas analogous codes for left-hemispheric processes enhance categorical or linguistic properties and (2) reconstruction or retrieval of episodic (rather than semantic) memory metabolically activates the right anterior prefrontal cortices (Buckner & Petersen, 1996), relative increases of contributions from right-hemispheric processes could strongly influence the fabric of this reconstruction (Persinger & Richards, 1994).

This experiment was designed to pursue this notion. We reasoned that even a brief (2 min.), unrelated reference to an emotional topic (child sexual abuse or abduction by aliens) presented more than 15 minutes after an ambiguous story (to avoid direct temporary contiguity) could affect reconstruction of the story one week later. These two topics (sexual abuse and alien abduction) have been employed because they show similarities of occurrence within belief structures (Persinger, 1992). Both have strong emotional mean-

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ings but markedly different probabilities of objective occurrence. One week was selected as the time interval to eliminate confounding contributions from short-term and intermediate memory. We hypothesized that enhanced activity of right-hemispheric processes, as inferred by hypnotic-induction scores and the experience of a presence or intrusive ("ego-alien") thoughts, would increase the proportions of inaccuracies during reconstruction of a narrative and be positively correlated with the persons' beliefs about the prevalence of unsubstantiated events such as alien abduction or childhood sexual abuse (Dittburner & Persinger, 1993). An association between beliefs of prevalence and right-hemispheric activation was hypothesized because the latter has a critical role in the cognitive representation of extrapersonal space.

Method

Sample

A total of 36 university men ($n = 18$) and women ($n = 18$), 19 to 48 years of age ($Mdn = 20$ years), volunteered as subjects; each received a 2% bonus for participation in an experiment concerning hypnosis.

Procedure

Before the experiment began, 12 subjects (6 men, 6 women) were assigned in a serial sequence to one of three experimental conditions. Each subject sat within a comfortable chair that was housed within a commercial acoustic chamber. After the experimenter had left, the subject listened to an audiotape of the Billy Story (Dittburner & Persinger, 1993), a 5-min. narrative concerning a young boy who experiences emotional nocturnal phenomena (actually the experiential concomitants of a complex partial epileptic seizure). The temporal distractors involved the presentation of 60 pairs of words from the Dichotic Word Listening Task (Roberts, Persinger, Grote, Evertowski, Springer, Tuten, Moulden, Franzen, Roberts, & Baglio, 1994). The laterality index, defined as the ratio of the numbers of correct responses for the right ear minus the numbers of correct responses for the left ear, divided by the sum of the numbers of correct responses for the left and right ears, was calculated. After this task was completed each subject was administered Spiegel and Spiegel's (1978) Hypnotic Induction Profile; its scores range from 0 to 10.

During the postinduction phase each person was administered one of three conditions to which they had been assigned. For two of the conditions the subjects listened to one of two nearly identical taped comments (2 min.) that differed only in the reference to subject matter, i.e., child abuse or abduction by aliens [see Dittburner and Persinger (1993) for details to obtain protocol]. The comments began "Many psychologists feel that their work

should be relevant to society. One recent issue involves . . . [parenting practices and child abuse/extraterrestrial life and abduction during childhood]. Supportive literature was included. At the end of the comments, the sentence "Psychologists and social workers do not yet know how many children think . . . [they have been abused/think they have been abducted]. The subject was then asked "of all the people you know, what percentage do you think believe they were abducted?". Subjects within the third (reference or control) group were not given this treatment.

Each subject then completed the Exit Questionnaire which contained 20 items that refer to the frequency (0 = never, 1 = at least once, 2 = several times) of unusual experiences during the experiment (Ruttan, Persinger, & Koren, 1990). Responses to two key items which referred to a sensed presence and the experience of "ego-alien" ideas, i.e., "there were thoughts that did not come from my own mind" were selected. The mean of the two items (which typically loaded on the same factor for men and women although the loading of a presence is stronger for women while that of "intrusive ideas" was stronger for men) were divided by the mean for the scores of all of the experiences to control for the person's general imaginative baseline. The experience of visual sensations (primarily phosphenes) along the left or right and upper or lower visual fields was also obtained. Subjects were requested to return to the setting one week later to complete the experiment but were not told they would be required to remember (reconstruct) the story.

At that time each subject was asked to reconstruct (write all of the details) of the narrative while sitting alone within the acoustic chamber (the context in which they had acquired the information); a maximum of 5 min. was allowed. The narratives were scored by a standardized protocol that divided the story into 10 segments (equivalent to about 30 sec. in real time) of 24 to 26 ideas ($N = 250$) in the story. The scoring procedure and concept was similar to that employed clinically by the Wechsler Memory Scale. To qualify as a direct recall, the subject's reconstruction of a segment was required to be verbatim. An inference or paraphrase was defined as any idea that was not literally present within the story but exhibited the general theme. All analyses used SPSS software on a VAX 4000 computer.

Results

The means and standard deviations for the population (all subjects) for the primary measures were percent direct (verbatim) recall for details for the story 10.4% and 7.9%, proportion of inferences 28.8% and 13.7%, lateralization index for the Dichotic Word Listening Task 0.01 and 0.08, sense of presence score 0.27 and 0.57, Spiegel and Spiegel's Hypnotic Induction Profile 7.2 and 2.5, and estimated prevalence of abuse or abduction (for the two

groups) 14.5% and 17.9%. The numbers of correct responses for the Dichotic Word-listening Task for the left ear, right ear, and both ears were 54.8 and 4.1, 54.7 and 6.1, and 50.9 and 8.0, respectively.

Two-way analysis of variance for these measures for condition (all *df*s = 2,30) and sex (all *df*s = 1,30) demonstrated statistically significant sex differences on the Hypnotic Induction Profile. The women displayed higher ($F = 6.55$, $p < .05$) suggestibility ($M = 8.2$, $SD = 1.2$) than did the men ($M = 6.2$, $SD = 3.1$); the trend for women to show more left-ear lateralization ($M = -0.03$, $SD = 0.10$) than the men ($M = 0.02$, $SD = 0\ 05$) was not significant statistically ($F = 3.53$, $\eta = 0.31$, $.05 < p < .10$). Although only the treatment differences for the proportion of inferences was not significant ($p < .10$), direct comparisons of the two conditions who received the innuendos (child abuse $M = 31.5\%$, $SD = 16.5\%$ and alien abduction: $M = 33.1\%$, $SD = 11.2\%$), after responses were aggregated, exhibited significantly more paraphrases ($M = 32.3\%$, $SD = 13.8\%$) than did the reference condition who received no allusions ($M = 20.9\%$, $SD = 13.7\%$) during this segment of the experiment ($F = 5.12$, $p < .05$; $\eta = 0.46$). The estimated prevalence of child abuse ($M = 22.9\%$, $SD = 19.3\%$) for people the participants of the experiment knew was significantly higher ($F_{1,23} = 6.10$, $p < .05$) than for the estimated incidence of alien abductions during childhood ($M = 6.7\%$, $SD = 12.9\%$). There were no statistically significant interactions (all *df*s = 2,30) between sex and treatments for any of these measures.

The Spearman *rho* correlations between the primary variables demonstrated statistically significant ($p < .01$) correlations only between estimates of prevalence (abuse/abduction) and the frequency of the sense of a presence while in the chamber (*rho* = .49), hypnotic suggestibility and the frequency of a sense of presence (*rho* = .40), dichotic listening laterality and suggestibility (*rho* = −.37), and, dichotic listening laterality and the frequency of the sense of presence (*rho* = −.41). Because absence of significant differences of the means of scores for variables between men and women does not imply an absence of significant differences between the patterns of intercorrelations (Persinger, 1991, 1996), the second part of this study evaluated men and women separately. The intercorrelations (Spearman *rho* because there were differences in scaling between the variables) of these variables for men and women are shown in Table 1.

Factor analysis (PA1) after varimax rotation for the variables (loadings in parentheses) showed that sense of presence (.63), during the sessions, suggestibility (.77), and dichotic laterality (−.74) composed one factor (accounting for 39% of the variance) while the second factor (accounting for 28% of the variance) was loaded by the numbers of intrusive errors for the narrative (.90) and by the sense of presence during the experiment (.50). When the participants' estimates of prevalence of abuse or abduction were added to

the analysis, they loaded (.79) on the same factor (accounting for 51% of the variance; eigenvalue = 2.59) as did the sense of presence (.81), ease of hypnotic induction (.67), and laterality (−.65).

TABLE 1
PEARSON INTERCORRELATIONS BETWEEN KEY VARIABLES OF SENSE OF A PRESENCE DURING THE EXPERIMENT, ESTIMATED PREVALENCE OF ABUSE AMONG SUBJECTS' FRIENDS, SUGGESTIBILITY SCORE, EXPERIENCES OF EGO-ALIEN INTRUSIONS DURING SESSION, AND LATERALITY OF DICHOTIC LISTENING ACCURACY FOR 18 MEN AND 18 WOMEN

Variable	1	2	3	4	5
			Men		
1. Presence		0.39	0.53	−0.12	−0.36
2. Prevalence	0.56*		0.41	−0.07	−0.59*
3. Hypnotic Induction Profile	0.22	0.02		−0.21	−0.30
4. Intrusions	0.34	0.32	−0.36		0.17
5. Laterality	−0.47*	−0.05	−0.27	−0.11	
			Women		

*$p < .05$. †$p < .01$.

To assess consistency of the experiential accounts the associations between the occurrence of visual sensations (primarily phosphenes) within either the upper or lower visual fields and along left or right peripheral visual fields were estimated for the major variables. Hypnotic suggestibility scores were associated with incidence of visual sensations in the upper visual field (*rho* = .60) along the left side (.54) but not along the right side (.14) or lower visual field (.20) for the men. There were no significant associations between these variables for the women. Both men (*rho* = .73) and women (*rho* = .52) showed significant ($p < .05$) associations between experiences of meaningfulness and emotionality during the story and their scores on hypnotizability. The proportion of inferences within the reconstructed narratives was negatively associated with experiences of having had similar sensations elsewhere (men = −.64; women = −.56).

Although the classic U-shaped, serial memory effect has always been found for the recall of the 10 segments of the Billy Story, we found an anomaly during Segment 6 which involves the emotional, nocturnal experiences of the boy. The means and standard deviations for the numbers of verbatim details recalled per segment for the 10 segments were 4.5 (2.9), 3.0 (3.8), 3.5 (4.1), 1.3 (2.6), 1.7 (1.7), [Segment six 4.1 (2.7)], 1.8 (1.9), 0.5 (1.1), 2.1 (2.8), and 3.7 (3.8), respectively. *Post hoc t* tests for correlated data indicated that Segment 6 contained more literal details than Segments 5, 7, or 8. The serial pattern for the numbers of inferences or paraphrases was similar.

To detect potentially recondite patterns factor analysis was completed for the relative proportion of inferences (to reduce the effects from differ-

ences in absolute memory capacity between subjects) for each of the 10 segments. Four factors emerged and subsequent analysis of variance (condition and sex) yielded only one statistically significant ($F = 4.36$, $p < .05$; $\eta = 0.46$) difference between conditions and no sex differences or interactions between sex and conditions. This factor, which was loaded significantly by scores on Segments 2, 3, 6, and 9, contained more proportions of inferences for the group who had received the alien innuendo (z score $M = .56$, $SD = 1.22$) than for the group who received the innuendo about abuse ($M = -.03$, $SD = .75$), or the reference group ($M = -.56$, $SD = .63$).

Discussion

The results supported the hypothesis that a brief unrelated comment noncontiguous but temporally after an ambiguous narrative can increase the numbers of inferences or potentially intrusive errors without affecting the numbers of verbatim (veridical) details of the reconstruction of that narrative one week later. Whereas about one-fifth of the reconstruction of details from the narrative involved inferential details (which could encourage erroneous imagery and attribution) for the reference group, about one-third of the details for the narratives for the groups who heard about either child sexual abuse or alien abductions involved these types of statements. However, the mean numbers of verbatim ideas reconstructed did not differ between the groups.

The occurrence of more relative numbers of inferential statements within specific segments of the story (which contained the specific allusion to "bright lights" in the sky and the "presence" of something in the room with the young boy") for the group who recalled the details more than one week after they were asked about the prevalence of alien abductions would be consistent with our hypothesis. Because we did not assess the themes of the narrative errors, we do not know if the inferences contained intrusive errors (information not contained within the story) congruent with the allusions. However, these results suggest that factor analysis of the scores for the different successive segments within a serial learning curve may yield information regarding subtle neurocognitive processes.

The significant association between less cerebral lateralization for language [as inferred by the less strong right-ear advantage or relatively greater left-ear advantage for the Roberts' Dichotic Word Listening Task] and the more frequent experiences of a sense of presence or "ego-alien thoughts" is commensurate with the hypothesis that reduction in lateralization increases the probability of intrusions into the left hemisphere (and awareness) of the right-hemispheric homologue of the sense of self (Persinger, 1993, 1996). Such intrusions could carry the affective dimensions of words, phrases, and spatial contexts into the left-hemispheric processes that maintain or generate

linguistic categorization and consequently widen the *response* generalization curve within the lexicon. Consistent with this metaphor, reconstruction of the narrative experience would contain proportionally more inferences without altering the rate of recall of numbers of memories for literal details. These results would also be compatible with the recent work of Whissell and Kienapple (1995) who reported that false recognitions for mood-matching words became as frequent as correct recognitions for the target words when testing occurred one week after the acquisition of the word lists.

The interpretation that the right temporal regions of those who experienced the sense of presence (and less cerebral lateralization) were more active electrically was supported by the positive correlation between the incidence of "a presence" and the experiences of "spontaneous" phosphenes within the upper and primarily left visual fields. Although phosphenes are frequently attributed to local (retinal rod) activity, these experiences are often associated with relatively increased electrical activity within the right temporooccipital regions.

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